

Search Plan and Results

Question

What is the effect of replacing a high carbohydrate diet with a high monounsaturated fatty acid (MUFA) diet in persons with type 2 diabetes? (DGAC 2010)

What is the effect of dietary intake of n-6 polyunsaturated fatty acids (PUFA) on increased risk of cardiovascular disease and type 2 diabetes, including intermediate markers such as lipid and lipoprotein levels and inflammation? (DGAC 2010)

What is the effect of dietary intake of monounsaturated fatty acids (MUFA) when substituted for saturated fatty acids on increased risk of cardiovascular disease and type 2 diabetes, including intermediate markers such as lipid and lipoprotein levels and inflammation? (DGAC 2010)

Date Searched

06/21/09 to 08/11/09, 10/26/2009

Inclusion Criteria

Health Outcomes

- Lipid and lipoprotein levels (LDL-C, HDL-C, non-HDL-C)
- Markers of inflammation
- Glucose tolerance, HbA_{1c} values, insulin resistance.

Subjects/Population

- *Age:* Two years to adult
- *Setting:* US and international
- *Health status:* Healthy population and those with elevated chronic risk (CHD or CVD, type 2 diabetes, metabolic syndrome and obesity).

Search Criteria

- *Study design preferences:* RCT or clinical controlled studies, large non-randomized observational studies, meta-analysis and systematic reviews. Feeding period must be greater than four weeks
- *Size of study groups:* Sample size more than 10 subjects for each study group
- *Study dropout rate:* Less than 20%; preference for smaller dropout rates
- *Year range:* 2004 to October 2009
- *Languages:* Limited to articles in English
- *Other:* Article must be published in peer-reviewed journal.

Exclusion Criteria

Subjects/Population

- *Age:* Infants less than two years

- *Setting:* Inpatients
- *Health status:* None.

Search Criteria

- *Size of study groups:* Sample sizes less than 10
- *Study designs:* Cross-sectional; feeding periods less than four weeks; experimental fat must be from natural source
- *Study dropout rate:* If the dropout rate in a study is 20% or greater, the study will be rejected
- *Year range:* Prior to December 2003
- *Other:* Animal studies, abstracts or presentations.

Search Terms: Search Vocabulary

Search Terms

"Fatty Acids, Omega-6"[Majr>NoExp] AND (triglycerides[majr] OR cholesterol[majr] OR "Diabetes Mellitus, Type 2"[mh] OR Myocardial infarction[majr] OR "Coronary Disease"[majr] "Heart Diseases"[majr] OR "Cardiovascular Diseases"[majr>NoExp]) lim eng/humans

oleic acid[mh] AND (glucose[majr] OR metabolic syndrome* OR insulin sensitivit* OR "Diabetes Mellitus, Type 2"[Mesh] OR hyperglycemia OR lipidemia OR "Body weight"[majr])

((n-6 AND (polyunsaturated OR PUFA*))) OR "Linolenic Acids"[Mesh] OR "Linoleic Acid"[Mesh] OR "Arachidonic Acid"[Mesh] AND "Diabetes Mellitus, Type 2"[Mesh]

(n-6 AND (polyunsaturated OR PUFA*)) AND (Myocardial infarction[majr] OR "Coronary Disease"[majr] "Heart Diseases"[majr] OR "Cardiovascular Diseases"[majr>NoExp])

((n-6 AND (polyunsaturated OR PUFA*))) OR "Linolenic Acids"[Mesh] OR "Linoleic Acid"[Mesh] OR "Arachidonic Acid"[Mesh] AND (triglycerides[majr] OR cholesterol[majr])

("Linolenic Acids"[Mesh] OR "Linoleic Acid"[Mesh] OR "Arachidonic Acid"[Mesh] OR oleic acid[mh]) AND (Myocardial infarction[mh] OR "Coronary Disease"[mh] OR "Cerebrovascular Disorders"[mh>NoExp] OR "Stroke"[mh>NoExp] OR "Heart Diseases"[mh] OR "Cardiovascular Diseases"[mh>NoExp]) 68 + 25 = 93 hits (limit to clinical trials, prospective studies, systematic reviews/meta)

oleic acid[mh] AND (Myocardial infarction[mh] OR "Coronary Disease"[majr] OR "Cerebrovascular Disorders"[majr>NoExp] OR "Stroke"[Majr>NoExp] OR "Heart Diseases"[majr] OR "Cardiovascular Diseases"[Majr>NoExp] OR "Triglycerides"[Mesh] OR "Arrhythmias, Cardiac"[Mesh] OR clotting OR Inflammation[mh] OR "Blood Pressure"[mh])

("Linolenic Acids"[Mesh] OR "Linoleic Acid"[Mesh] OR "Arachidonic Acid"[Mesh]) AND (Myocardial infarction[mh] OR "Coronary Disease"[majr] OR "Cerebrovascular Disorders"[majr>NoExp] OR "Stroke"[Majr>NoExp] OR "Heart Diseases"[majr] OR

"Cardiovascular Diseases"[Majr>NoExp] OR "Triglycerides"[Mesh] OR "Arrhythmias, Cardiac"[Mesh] OR clotting OR Inflammation[mh] OR "Blood Pressure"[mh])

("Coronary Disease"[Mesh] OR "Cerebrovascular Disorders"[Mesh>NoExp] OR "Stroke"[Mesh>NoExp] OR "Heart Diseases"[Mesh] OR "Cardiovascular Diseases"[Mesh>NoExp] OR "Diabetes Mellitus, Type 2"[Mesh]) AND "Dietary Fats, Unsaturated"[Mesh] AND (Polyunsaturated OR PUFA* OR Monounsaturated OR MUFA*)

"Diabetes Mellitus, Type 2"[Mesh] AND (Polyunsaturated OR PUFA* OR Monounsaturated OR MUFA*)

Electronic Databases

Total hits from all electronic database searches: 871

Total articles identified to review from electronic databases: 65

Articles Identified Via Handsearch or Other Means

Summary of Articles Identified to Review

Number of Primary Articles Identified: 23

Number of Review Articles Identified: 1

Total Number of Articles Identified: 24

Number of Articles Reviewed but Excluded: 41

List of Articles Included for Evidence Analysis

MUFA and Health Outcomes

1. What is the effect of dietary intake of MUFA when substituted for SFA on increased risk of CVD and type 2 diabetes (T2D), including intermediate markers such as lipid and lipoprotein levels and inflammation?

Systematic Reviews/Meta-analysis

Jakobsen MU, O'Reilly EJ, Heitmann BL, Pereira MA, Bälter K, Fraser GE, Goldbourt U,

Hallmans G, Knekt P, Liu S, Pietinen P, Spiegelman D, Stevens J, Virtamo J, Willett WC, Ascherio A. [Major types of dietary fat and risk of coronary heart disease: A pooled analysis of 11 cohort studies](#). *Am J Clin Nutr.* 2009 May; 89(5): 1, 425-1, 432. Epub 2009 Feb 11. PMID: 19211817.

Primary Articles

Allman-Farinelli MA, Gomes K, Favaloro EJ, Petocz P. [A diet rich in high-oleic-acid sunflower oil favorably alters low-density lipoprotein cholesterol, triglycerides, and factor VII coagulant activity](#). *J Am Diet Assoc.* 2005 Jul; 105(7): 1, 071-1, 079. PMID: 15983523.

Appel LJ, Sacks FM, Carey VJ, Obarzanek E, Swain JF, Miller ER 3rd, Conlin PR, Erlinger TP, Rosner BA, Laranjo NM, Charleston J, McCarron P, Bishop LM; OmniHeart Collaborative Research Group. [Effects of protein, monounsaturated fat, and carbohydrate intake on blood pressure and serum lipids: Results of the OmniHeart randomized trial](#). *JAMA.* 2005 Nov 16; 294(19): 2, 455-2, 464. PMID: 16287956.

Berglund L, Lefevre M, Ginsberg HN, Kris-Etherton PM, Elmer PJ, Stewart PW, Ershow A, Pearson TA, Dennis BH, Roheim PS, Ramakrishnan R, Reed R, Stewart K, Phillips KM; DELTA Investigators. [Comparison of monounsaturated fat with carbohydrates as a replacement for saturated fat in subjects with a high metabolic risk profile: Studies in the fasting and postprandial states](#). *Am J Clin Nutr.* 2007 Dec; 86(6): 1, 611-1, 620. PMID: 18065577.

Binkoski AE, Kris-Etherton PM, Wilson TA, Mountain ML, Nicolosi RJ. [Balance of unsaturated fatty acids is important to a cholesterol-lowering diet: Comparison of mid-oleic sunflower oil and olive oil on cardiovascular disease risk factors](#). *J Am Diet Assoc.* 2005 Jul; 105(7): 1, 080-1, 086. PMID: 15983524.

Clifton PM, Noakes M, Keogh JB. [Very low-fat \(12%\) and high monounsaturated fat \(35%\) diets do not differentially affect abdominal fat loss in overweight, nondiabetic women](#). *J Nutr.* 2004 Jul; 134(7): 1, 741-1, 745. PMID: 15226463.

[Due A, Larsen TM, Mu H, Hermansen K, Stender S, Astrup A. Comparison of 3 ad libitum diets for weight-loss maintenance, risk of cardiovascular disease, and diabetes: A six-month randomized, controlled trial](#). *Am J Clin Nutr.* 2008 Nov; 88(5): 1, 232-1, 241. PMID: 18996857.

Haban P, Klvanova J, Zidekova E, Nagyova A. [Dietary supplementation with olive oil leads to improved lipoprotein spectrum and lower n-6 PUFAs in elderly subjects](#). *Med Sci Monit.* 2004 Apr; 10(4): PI49-PI54. PMID: 15039655.

Paniagua JA, de la Sacristana AG, Sánchez E, Romero I, Vidal-Puig A, Berral FJ, Escribano A, Moyano MJ, Peréz-Martínez P, López-Miranda J, Pérez-Jiménez F. [A MUFA-rich diet improves posprandial glucose, lipid and GLP-1 responses in insulin-resistant subjects](#). *J Am Coll Nutr.* 2007 Oct; 26(5): 434-444. PMID: 17914131.

Rasmussen BM, Vessby B, Uusitupa M, Berglund L, Pedersen E, Riccardi G, Rivellese AA, Tapsell L, Hermansen K; KANWU Study Group. [Effects of dietary saturated, monounsaturated, and n-3 fatty acids on blood pressure in healthy subjects](#). *Am J Clin Nutr.*

2006 Feb; 83(2): 221-226. PMID: 16469978.

Thijssen MA, Hornstra G, Mensink RP. [Stearic, oleic, and linoleic acids have comparable effects on markers of thrombotic tendency in healthy human subjects](#). *J Nutr.* 2005 Dec; 135(12): 2, 805-2, 811. PMID: 163171242.

Thijssen MA, Mensink RP. [Small differences in the effects of stearic acid, oleic acid, and linoleic acid on the serum lipoprotein profile of humans](#). *Am J Clin Nutr.* 2005 Sep; 82(3): 510-516. PMID: 16155261.

2. What is the effect of replacing a high carbohydrate diet with a high MUFA diet in persons with T2D?

Primary Articles

Brehm BJ, Lattin BL, Summer SS, Boback JA, Gilchrist GM, Handacek RJ, D'Alessio DA. [One-year comparison of a high-monounsaturated fat diet with a high-carbohydrate diet in type 2 diabetes](#). *Diabetes Care.* 2009; 32: 215-220. PMID: 18957534.

Brunerova L, Smejkalova V, Potockova J, Andel M. [A comparison of the influence of a high-fat diet enriched in monounsaturated fatty acids and conventional diet on weight loss and metabolic parameters in obese non-diabetic and Type 2 diabetic patients](#). *Diabet Med.* 2007 May; 24(5): 533-540. Epub 2007 Mar 22. PMID: 17381504.

Gerhard GT, Ahmann A, Meeuws K, McMurry MP, Duell PB, Connor WE. [Effects of a low-fat diet compared with those of a high-monounsaturated fat diet on body weight, plasma lipids and lipoproteins, and glycemic control in type 2 diabetes](#). *Am J Clin Nutr.* 2004 Sep; 80(3): 668-673. PMID: 15321807.

Rodriguez-Villar C, Pérez-Heras A, Mercadé I, Casals E, Ros E. [Comparison of a high-carbohydrate and a high-monounsaturated fat, olive oil-rich diet on the susceptibility of LDL to oxidative modification in subjects with Type 2 diabetes mellitus](#). *Diabet Med.* 2004 Feb; 21(2): 142-149. PMID: 14984449.

Shah M, Adams-Huet B, Bantle JP, Henry RR, Griver KA, Raatz SK, Brinkley LJ, Reaven GM, Garg A. [Effect of a high-carbohydrate versus a high--cis-monounsaturated fat diet on blood pressure in patients with type 2 diabetes](#). *Diabetes Care.* 2005 Nov; 28(11): 2, 607-2, 612. PMID: 16249527.

N-6 PUFA and Health Outcomes

Systematic Reviews/Meta-analysis

Jakobsen MU, O'Reilly EJ, Heitmann BL, Pereira MA, Bälter K, Fraser GE, Goldbourt U, Hallmans G, Knekt P, Liu S, Pietinen P, Spiegelman D, Stevens J, Virtamo J, Willett WC, Ascherio A. [Major types of dietary fat and risk of coronary heart disease: a pooled analysis of 11 cohort studies](#). *Am J Clin Nutr.* 2009 May; 89(5): 1, 425-1, 432. Epub 2009 Feb 11. PMID: 19211817.

Primary Articles

Hodge AM, English DR, O'Dea K, Sinclair AJ, Makrides M, Gibson RA, Giles GG. [Plasma](#)

[phospholipid and dietary fatty acids as predictors of type 2 diabetes: Interpreting the role of linoleic acid.](#) *Am J Clin Nutr.* 2007 Jul; 86(1): 189-197. PMID: 17616780.

Laaksonen DE, Nyyssönen K, Niskanen L, Rissanen TH, Salonen JT. [Prediction of cardiovascular mortality in middle-aged men by dietary and serum linoleic and polyunsaturated fatty acids.](#) *Arch Intern Med.* 2005 Jan 24; 165(2): 193-199. PMID: 15668366.

Liou YA, King DJ, Zibrik D, Innis SM. [Decreasing linoleic acid with constant alpha-linolenic acid in dietary fats increases \(n-3\) eicosapentaenoic acid in plasma phospholipids in healthy men.](#) *J Nutr.* 2007 Apr; 137(4): 945-952. PMID: 17374659.

Mozaffarian D, Ascherio A, Hu FB, Stampfer MJ, Willett WC, Siscovick DS, Rimm EB. [Interplay between different polyunsaturated fatty acids and risk of coronary heart disease in men.](#) *Circulation.* 2005 Jan 18; 111(2): 157-164. Epub 2005 Jan 3. PMID: 15630029.

Oh K, Hu FB, Manson JE, Stampfer MJ, Willett WC. [Dietary fat intake and risk of coronary heart disease in women: 20 years of follow-up of the nurses' health study.](#) *Am J Epidemiol.* 2005 Apr 1; 161(7): 672-679. PMID: 15781956.

St-Onge MP, Aban I, Bosarge A, Gower B, Hecker KD, Allison DB. [Snack chips fried in corn oil alleviate cardiovascular disease risk factors when substituted for low-fat or high-fat snacks.](#) *Am J Clin Nutr.* 2007 Jun; 85(6): 1, 503-1, 510. PMID: 17556685.

Thijssen MA, Hornstra G, Mensink RP. [Stearic, oleic, and linoleic acids have comparable effects on markers of thrombotic tendency in healthy human subjects.](#) *J Nutr.* 2005 Dec; 135(12): 2, 805-2, 811. PMID: 16317124.

Thijssen MA, Mensink RP. [Small differences in the effects of stearic acid, oleic acid, and linoleic acid on the serum lipoprotein profile of humans.](#) *Am J Clin Nutr.* 2005 Sep; 82(3): 510-516. PMID: 16155261.

Zhao G, Etherton TD, Martin KR, West SG, Gillies PJ, Kris-Etherton PM. [Dietary alpha-linolenic acid reduces inflammatory and lipid cardiovascular risk factors in hypercholesterolemic men and women.](#) *J Nutr.* 2004 Nov; 134(11): 2, 991-2, 887. PMID: 15514264.

List of Excluded Articles with Reason

Article (A–J)	Reason for Exclusion
Berry SE, Miller GJ, Sanders TA. The solid fat content of stearic acid-rich fats determines their postprandial effects. <i>Am J Clin Nutr.</i> 2007 Jun; 85(6): 1, 486-1, 494. PMID: 17556683.	Both study arms involve high fat. Outcomes are related to commercial randomization of oils.
Bondia-Pons I, Schröder H, Covas MI, Castellote AI, Kaikkonen J, Poulsen HE, Gaddi AV, Machowetz A, Kiesewetter H, López-Sabater MC. Moderate consumption of olive oil by healthy European men reduces systolic blood pressure in non-Mediterranean participants. <i>J Nutr.</i> 2007	Treatment period too short (three weeks).

Jan; 137(1): 84-87. PMID: 17182805.

Carrero JJ, Baró L, Fonollá J, González-Santiago M, Martínez-Férez A, Castillo R, Jiménez J, Boza JJ, López-Huertas E. [Cardiovascular effects of milk enriched with omega-3 polyunsaturated fatty acids, oleic acid, folic acid, and vitamins E and B₆ in volunteers with mild hyperlipidemia](#). *Nutrition*. 2004 June; 20(6): 521-527. PMID 15165614.

Carrero JJ, Fonollá J, Martí JL, Jiménez J, Boza JJ, López-Huertas E. Intake of fish oil, oleic acid, folic acid, and vitamins B₆ and E for 1 year decreases plasma C-reactive protein and reduces coronary heart disease risk factors in male patients in a cardiac rehabilitation program. *J Nutr*. 2007 Feb; 137(2): 384-390. PMID: 17237316.

Cicero AF, Nascetti S, López-Sabater MC, Elosua R, Salonen JT, Nyssönen K, Poulsen HE, Zunft HJ, Kiesewetter H, de la Torre K, Covas MI, Kaikkonen J, Mursu J, Koenick C, Bäumler H, Gaddi AV; EUROLIVE Study Group. [Changes in LDL fatty acid composition as a response to olive oil treatment are inversely related to lipid oxidative damage: The EUROLIVE study](#). *J Am Coll Nutr*. 2008 Apr; 27(2): 314-320. PMID: 18689564.

Covas MI, Nyssönen K, Poulsen HE, Kaikkonen J, Zunft HJ, Kiesewetter H, Gaddi A, de la Torre R, Mursu J, Bäumler H, Nascetti S, Salonen JT, Fitó M, Virtanen J, Marrugat J, EUROLIVE Study Group. [The effect of polyphenols in olive oil on heart disease risk factors: a randomized trial](#). *Ann Intern Med*. 2006 Sep 5; 145(5): 333-341. PMID: 16954359.

Damsgaard CT, Frøkjaer H, Andersen AD, Lauritzen L. [Fish oil in combination with high or low intakes of linoleic acid lowers plasma triacylglycerols but does not affect other cardiovascular risk markers in healthy men](#). *J Nutr*. 2008 Jun; 138(6): 1, 061-1, 066. PMID: 18492834.

Djoussé L, Hunt SC, Arnett DK, Province MA, Eckfeldt JH, Ellison RC. [Dietary linolenic acid is inversely associated with plasma triacylglycerol: the National Heart, Lung, and Blood Institute Family Heart Study](#). *Am J Clin Nutr*. 2003 Dec; 78(6): 1, 098-1, 1102. PMID: 14668270.

Engler MM, Engler MB. [Omega-3 fatty acids: role in cardiovascular health and disease](#). *J Cardiovasc Nurs*. 2006 Jan-Feb; 21(1): 17-24, quiz 25-26. Review. PMID: 16407732.

Does not address questions. Study involves effect of milk enrichment and does not look at the relationship of variables in question.

Multiple variables supplemented at same time.

Intervention provided as capsule.

Does not address question. Studies effect of polyphenols in olive oil on heart disease risk factors.

Intervention provided as capsule. Other nutrients unaccounted for.

Does not meet inclusion criteria. Cross-sectional study.

Does not address questions. Descriptive. Metabolic effects of n-3.

<p>Erkkilä AT, Matthan NR, Herrington DM, Lichtenstein AH. Higher plasma docosahexaenoic acid is associated with reduced progression of coronary atherosclerosis in women with CAD. <i>J Lipid Res.</i> 2006 Dec; 47(12): 2, 814-2, 819. Epub 2006 Sep 18. PMID: 16983146.</p>	<p>Moved to n-3 marine and plant questions.</p>
<p>Estruch R, Martínez-González MA, Corella D, Salas-Salvadó J, Ruiz-Gutiérrez V, Covas MI, Fiol M, Gómez-Gracia E, López-Sabater MC, Vinyoles E, Arós F, Conde M, Lahoz C, Lapetra J, Sáez G, Ros E; PREDIMED Study Investigators. Effects of a Mediterranean-style diet on cardiovascular risk factors: A randomized trial. <i>Ann Intern Med.</i> 2006 Jul 4; 145(1): 1-11. PMID: 16818923.</p>	<p>Does not look at relationships between variables. Examines Mediterranean Pattern, not specifically MUFA or PUFA.</p>
<p>Fitó M, Cladellas M, de la Torre R, Martí J, Alcántara M, Pujadas-Bastardes M, Marrugat J, Bruguera J, López-Sabater MC, Vila J, Covas MI; The members of the SOLOS Investigators. Antioxidant effect of virgin olive oil in patients with stable coronary heart disease: A randomized, crossover, controlled, clinical trial. <i>Atherosclerosis</i>. 2005 Jul; 181(1): 149-158. Epub 2005 Feb 12. PMID: 15939067.</p>	<p>Does not look at relationships between variables. Compares antioxidant effect of two olive oils, one with higher phenolic content.</p>
<p>Fitó M, Cladellas M, de la Torre R, Martí J, Muñoz D, Schröder H, Alcántara M, Pujadas-Bastardes M, Marrugat J, López-Sabater MC, Bruguera J, Covas MI; SOLOS Investigators. Anti-inflammatory effect of virgin olive oil in stable coronary disease patients: A randomized, crossover, controlled trial. <i>Eur J Clin Nutr.</i> 2008 Apr; 62(4): 570-574. Epub 2007 Mar 21. PMID: 17375118.</p>	<p>Does not look at relationships between variables. Compares antioxidant effect of two olive oils, one with higher phenolic content.</p>
<p>Freese R, Vaarala O, Turpeinen AM, Mutanen M. No difference in platelet activation or inflammation markers after diets rich or poor in vegetables, berries and apples in healthy subjects. <i>Eur J Nutr.</i> 2004 Jun; 43(3): 175-182. Epub 2004 Jan 6. PMID: 15168040.</p>	<p>Does not address question. Variables studied are vegetables, berries and apples.</p>
<p>Garg A. High-monounsaturated-fat diets for patients with diabetes mellitus: A meta-analysis. <i>Am J Clin Nutr.</i> 1998 Mar; 67(3 Suppl): 577S-582S. PMID: 9497173.</p>	<p>Does not meet inclusion criteria. Study conducted 1998.</p>
<p>Gaullier JM, Halse J, Høye K, Kristiansen K, Fagertun H, Vik H, Gudmundsen O. Conjugated linoleic acid supplementation for one year reduces body fat mass in healthy overweight humans. <i>Am J Clin Nutr.</i> 2004 Jun; 79(6): 1, 118-1, 125. PMID: 15159244.</p>	<p>Intervention provided as capsule.</p>

Gradek WQ, Harris MT, Yahia N, Davis WW, Le NA, Brown WV. Polyunsaturated fatty acids acutely suppress antibodies to malondialdehyde-modified lipoproteins in patients with vascular disease. <i>Am J Cardiol.</i> 2004 Apr 1; 93(7): 881-885. PMID: 15050493.	Does not meet inclusion criteria for feeding period. Short-term, postprandial metabolic study.
Harper CR, Jacobson TA. Usefulness of omega-3 fatty acids and the prevention of coronary heart disease. <i>Am J Cardiol.</i> 2005 Dec 1; 96(11): 1, 521-1, 529. Epub 2005 Oct 21. PMID: 16310434.	Non-systematic negative review.
Harris WS. Linoleic acid and coronary heart disease. Prostaglandins Leukot Essent Fatty Acids. 2008 Sep-Nov;79(3-5):169-71. Epub 2008 Oct 31. PMID: 18951772	Narrative review
Hartweg J, Farmer AJ, Holman RR, Neil A. Potential impact of omega-3 treatment on cardiovascular disease in type 2 diabetes. <i>Curr Opin Lipidol.</i> 2009 Feb; 20(1): 30-38. PMID: 19133409.	Treatment uses of omega-3 fatty acids.
Hilpert KF, West SG, Kris-Etherton PM, Hecker KD, Simpson NM, Alaupovic P. Postprandial effect of n-3 polyunsaturated fatty acids on apolipoprotein B-containing lipoproteins and vascular reactivity in type 2 diabetes. <i>Am J Clin Nutr.</i> 2007 Feb; 85(2): 369-376. PMID: 17284731.	Does not meet feeding criteria. Feeding period less than four weeks.

Article (K-Z)	Reason for Exclusion
Kabagambe EK, Baylin A, Ascherio A, Campos H. The type of oil used for cooking is associated with the risk of nonfatal acute myocardial infarction in Costa Rica. <i>J Nutr.</i> 2005 Nov; 135(11): 2, 674-2, 679. PMID: 16251629.	Does not meet inclusion criteria. Case control study.
Kontogianni MD, Panagiotakos DB, Chrysohoou C, Pitsavos C, Zampelas A, Stefanadis C. The impact of olive oil consumption pattern on the risk of acute coronary syndromes: The CARDIO2000 case-control study. <i>Clin Cardiol.</i> 2007 Mar; 30(3): 125-129. PMID: 17385704.	Does not meet inclusion criteria. Case control study.
Kris-Etherton PM, Hecker KD, Binkoski AE. Polyunsaturated fatty acids and cardiovascular health. <i>Nutr Rev.</i> 2004 Nov; 62(11): 414-426. Review. PMID: 15622714.	Non-systematic narrative review.

<p>Kris-Etherton PM, Pearson TA, Wan Y, Hargrove RL, Moriarty K, Fishell V, Etherton TD. <u>High-monounsaturated fatty acid diets lower both plasma cholesterol and triacylglycerol concentrations.</u> <i>Am J Clin Nutr.</i> 1999 Dec; 70(6): 1, 009-1, 015. PMID: 10584045.</p>	<p>Addresses the question. Published prior to inclusion dates</p>
<p>Levick SP, Loch DC, Taylor SM, Janicki JS. <u>Arachidonic acid metabolism as a potential mediator of cardiac fibrosis associated with inflammation.</u> <i>J Immunol.</i> 2007 Jan 15; 178(2): 641-646. PMID: 17202322.</p>	<p>Does not address questions. Narrative review.</p>
<p>López S, Bermúdez B, Pacheco YM, López-Lluch G, Moreda W, Villar J, Abia R, Muriana FJ. <u>Dietary oleic and palmitic acids modulate the ratio of triacylglycerols to cholesterol in postprandial triacylglycerol-rich lipoproteins in men and cell viability and cycling in human monocytes.</u> <i>J Nutr.</i> 2007 Sep; 137(9): 1, 999-2, 005. PMID: 17709433.</p>	<p>Postprandial study lasting three and five hours does not meet intake criteria. Studies fatty acid ratios.</p>
<p>Lovegrove JA. <u>CVD risk in South Asians: The importance of defining adiposity and influence of dietary polyunsaturated fat.</u> <i>Proc Nutr Soc.</i> 2007 May; 66(2): 286-298. Review. PMID: 17466109.</p>	<p>Negative review. Not systematic. Restricted to a defined foreign population</p>
<p>Madigan C, Ryan M, Owens D, Collins P, Tomkin GH. <u>Comparison of diets high in monounsaturated versus polyunsaturated fatty acid on postprandial lipoproteins in diabetes.</u> <i>J Med Sci.</i> 2005 Jan-Mar; 174(1): 8-20. PMID: 15868884.</p>	<p>Does not meet inclusion criteria. Short-term, postprandial study.</p>
<p>Malpuech-Brugère C, Verboeket-van de Venne WP, Mensink RP, Arnal MA, Morio B, Brandolini M, Saebo A, Lassel TS, Chardigny JM, Sébédo JL, Beaufrère B. <u>Effects of two conjugated linoleic acid isomers on body fat mass in overweight humans.</u> <i>Obes Res.</i> 2004 Apr; 12(4): 591-598. PMID: 15090626.</p>	<p>Does not meet inclusion criteria. Study investigates isomers of CLA.</p>
<p>Manning PJ, Sutherland WH, McGrath MM, de Jong SA, Walker RJ, Williams MJ. <u>Postprandial cytokine concentrations and meal composition in obese and lean women.</u> <i>Obesity (Silver Spring).</i> 2008 Sep; 16(9): 2, 046-2, 052. PMID: 19186329.</p>	<p>Does not meet inclusion criteria for feeding period. Short-term feeding followed by postprandial tests.</p>
<p>Montoya MT, Porres A, Serrano S, Fruchart JC, Mata P, Gerique JA, Castro GR. <u>Fatty acid saturation of the diet and plasma lipid concentrations, lipoprotein particle concentrations, and cholesterol efflux capacity.</u> <i>Am J Clin Nutr.</i> 2002 Mar; 75(3): 484-491. PMID: 11864853.</p>	<p>Note: Key evidence addressing the question presents data first published in 1996. New data is limited to lipoprotein particle distribution.</p>

<p>Moore CS, Bryant SP, Mishra GD, Krebs JD, Browning LM, Miller GJ, Jebb SA. Oily fish reduces plasma triacylglycerols: A primary prevention study in overweight men and women. <i>Nutrition</i>. 2006 Oct; 22(10): 1, 012-1, 024. PMID: 17027436.</p>	<p>Does not meet inclusion criteria. Covers omega-3 fatty acids.</p>
<p>Mozaffarian D. Does alpha-linolenic acid intake reduce the risk of coronary heart disease? A review of the evidence. <i>Altern Ther Health Med</i>. 2005 May-Jun; 11(3): 24-30; quiz 31, 79. PMID: 15945135.</p>	<p>Narrative review.</p>
<p>Mullen A, Moloney F, Nugent AP, Doyle L, Cashman KD, Roche HM. Conjugated linoleic acid supplementation reduces peripheral blood mononuclear cell interleukin-2 production in healthy middle-aged males. <i>J Nutr Biochem</i>. 2007 Oct; 18(10): 658-666. Epub 2007 Mar 21. PMID: 17368881.</p>	<p>Intervention provided as capsules.</p>
<p>Njelekela M, Ikeda K, Mtabaji J, Yamori Y. Dietary habits, plasma polyunsaturated fatty acids and selected coronary disease risk factors in Tanzania. <i>East Afr Med J</i>. 2005 Nov; 82(11): 572-578. PMID: 16463751.</p>	<p>Cross-sectional population study.</p>
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<p>Pacheco YM, Bermúdez B, López S, Abia R, Villar J, Muriana FJ. Ratio of oleic to palmitic acid is a dietary determinant of thrombogenic and fibrinolytic factors during the postprandial state in men. <i>Am J Clin Nutr</i>. 2006 Aug; 84(2): 342-349. PMID: 16895881.</p>	<p>Does not look at relationships between variables asked in question. Studies effect of ratios of MUFA:PUFA.</p>

